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WHAT IS CLAIMED IS:

- 1 1. A protein kinase which is a member of a superfamily, said protein kinase
2 being characterized by:
 - 3 A. greater than 40% sequence similarity with eEF-2 kinase from
4 any organism; and,
 - 5 B. phosphorylates an amino acid within an alpha helical domain
6 of its target protein.
- 1 2. A protein kinase of Claim 1 which phosphorylates eukaryotic elongation
2 factor-2 (eEF-2), and is designated as eukaryotic elongation factor-2 kinase (eEF-2
3 kinase).
- 1 3. A protein kinase of Claim 1 which phosphorylates eukaryotic myosin heavy
2 chain (MHC), and is designated as myosin heavy chain kinase (MHCK).
- 1 4. A protein kinase of Claim 1 that phosphorylates a peptide sequence derived
2 from the phosphorylation site of a target protein.
- 1 5. A peptide sequence having SEQ ID NO: 20.
- 1 6. A protein kinase of Claim 1 which is a polypeptide having an amino acid
2 sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 4, and
3 SEQ ID NO: 10, and fragments thereof.
- 1 7. A protein kinase of Claim 1 which is derived from mammalian cells.
- 1 8. A protein kinase of Claim 1 labeled with a detectable label.

- 1 9. A protein kinase of Claim 8 wherein the label is selected from enzymes,
2 chemicals which fluoresce, and radioactive elements.
- 1 10. An antibody to the protein kinase of Claim 1.
- 1 11. An antibody to the phosphorylated form of the target protein of Claim 1.
12. An antibody to the phosphorylated form of the peptide of Claim 5.
- 1 13. The antibody of Claim 10, 11 or 12 which is a polyclonal antibody.
- 1 14. The antibody of Claim 10, 11 or 12 which is a monoclonal antibody.
- 1 15. An immortal cell line that produces a monoclonal antibody according to
2 Claim 14.
- 1 16. The antibody of Claim 10, 11 or 12 labeled with a detectable label.
- 1 17. The antibody of Claim 10, 11 or 12 wherein the label is selected from
2 enzymes, chemicals which fluoresce and radioactive elements.
- 1 18. A DNA sequence which encodes eEF-2 kinase, or a fragment thereof,
2 selected from the group consisting of:
- 3 (A) the DNA sequences of FIGURE 5 (SEQ ID NO: 1);
4 (B) the DNA sequences of FIGURE 5 (SEQ ID NO: 3);
5 (C) the DNA sequences of FIGURE 5 (SEQ ID NO: 9);
6 (D) DNA sequences that hybridize to any of the foregoing DNA
7 sequences under standard hybridization conditions;
8 (E) DNA sequences that code for expression of an amino acid sequence
9 encoded by any of the foregoing DNA sequences.

- 10 (F) degenerate variants thereof;
11 (G) alleles thereof; and,
12 (H) hybridizable fragments thereof.

1 19. A recombinant DNA molecule comprising a DNA sequence which encodes
2 eEF-2 kinase, or a fragment thereof, selected from the group consisting of:

- 3 (A) the DNA sequences of FIGURE 5 (SEQ ID NO: 1);
4 (B) the DNA sequences of FIGURE 5 (SEQ ID NO: 3);
5 (C) the DNA sequences of FIGURE 5 (SEQ ID NO: 9);
6 (D) DNA sequences that hybridize to any of the foregoing DNA
7 sequences under standard hybridization conditions;
8 (E) DNA sequences that code for expression of an amino acid sequence
9 encoded by any of the foregoing DNA sequences.
10 (F) degenerate variants thereof;
11 (G) alleles thereof; and,
12 (H) hybridizable fragments thereof.

1 20. The recombinant DNA molecule of either of Claims 18 or 19, wherein said
2 DNA sequence is operatively linked to an expression control sequence.

1 21. The recombinant DNA molecule of Claim 20, wherein said expression
2 control sequence is selected from the group consisting of the early or late promoters
3 of SV40 or adenovirus, the *lac* system, the *trp* system, the *TAC* system, the *TRC*
4 system, the major operator and promoter regions of phage λ , the control regions of
5 fd coat protein, the promoter for 3-phosphoglycerate kinase, the promoters of acid
6 phosphatase and the promoters of the yeast α -mating factors.

1 22. A probe capable of screening for eEF-2 kinase in alternate species prepared
2 from the DNA sequence of Claim 18.

1 23. A probe capable of screening for members of the protein kinase superfamily
2 of Claim 1 prepared from the DNA sequence of Claim 18.

1 24. A unicellular host transformed with a recombinant DNA molecule
2 comprising a DNA sequence or degenerate variant thereof, which encodes a protein
3 kinase, or a fragment thereof, selected from the group consisting of:

4 (A) the DNA sequences of FIGURE 5 (SEQ ID NO: 1);

5 (B) the DNA sequences of FIGURE 5 (SEQ ID NO: 3);

6 (C) the DNA sequences of FIGURE 5 (SEQ ID NO: 9);

7 (D) DNA sequences that hybridize to any of the foregoing DNA
8 sequences under standard hybridization conditions; and

9 (E) DNA sequences that code on expression for an amino acid sequence
10 encoded by any of the foregoing DNA sequences;

11 wherein said DNA sequence is operatively linked to an expression control
12 sequence.

1 25. The unicellular host of Claim 24 wherein the unicellular host is selected
2 from the group consisting of *E. coli*, *Pseudomonas*, *Bacillus*, *Streptomyces*, yeasts,
3 CHO, R1.1, B-W, L-M, COS 1, COS 7, BSC1, BSC40, and BMT10 cells, plant
4 cells, insect cells, and human cells in tissue culture.

1 26. A method for detecting eEF-2 kinase and assessing eEF-2 kinase levels by:
2 A. contacting a biological sample from a mammal in which the
3 presence or activity of said eEF-2 kinase is suspected with a binding partner of said
4 eEF-2 kinase under conditions that allow binding of said eEF-2 kinase to said
5 binding partner to occur; and

6 B. detecting whether binding has occurred, and to what degree,
7 between said eEF-2 kinase from said sample and the binding partner;

8 wherein the detection of binding indicates that presence or activity of said
 9 eEF-2 kinase in said sample, and indicates a level of said eEF-2 kinase in the
 10 sample.

1 27. An assay system for screening drugs and other agents for ability to modulate
 2 eEF-2 kinase activity, comprising a predetermined amount of eEF-2 kinase mixed
 3 with varying amounts of drug or agent, along with target protein and ATP; wherein
 4 detection is *via* either a detectable label on the γ -phosphate of ATP, or on an
 5 antibody directed against the phosphorylated target protein..

1 28. The assay system of Claim 27 wherein the label on the γ -phosphate of ATP
 2 comprises one of the following:

- 3 A. ^{32}P ;
- 4 B. ^{33}P
- 5 C. ^{35}S
- 6 D. a biotinylated phosphate moiety; or,
- 7 E. a fluorescent phosphate moiety.

1 29. The assay system of Claim 27 wherein the label on the antibody comprises
 2 one of the following:

- 3 A. an enzyme detectable with colorimetric, fluorescent, or
- 4 chemiluminescent substrates, such as alkaline phosphatase or horseradish
- 5 peroxidase;
- 6 B. a biotin moiety;
- 7 C. a fluorescent moiety; or,
- 8 D. a radioactive moiety chosen from the following group of
- 9 isotopes: ^3H , ^{14}C , ^{32}P , ^{33}P , ^{35}S , ^{36}Cl , ^{51}Cr , ^{57}Co , ^{58}Co , ^{59}Fe , ^{90}Y , ^{125}I , ^{131}I , and ^{186}Re .

1 30. An assay system for screening drugs and other agents for ability to modulate
 2 eEF-2 kinase activity, comprising:

- 3 A. culturing an observable cellular test colony inoculated with a
 4 drug or agent;
 5 B. harvesting a supernatant from said cellular test colony; and,
 6 C. examining said supernatant for the presence of said eEF-2
 7 kinase activity wherein an increase or a decrease in a level of said eEF-2 kinase
 8 activity indicates the ability of a drug to modulate the activity of said eEF-2 kinase.

1 31. A test kit for assessing the level of eEF-2 kinase activity in a eukaryotic
 2 cellular sample, comprising:

- 3 A. a predetermined amount of a detectably labelled specific binding
 4 partner of eEF-2 kinase.
 5 B. other reagents; and,
 6 C. directions for use of said kit.

1 ~~31~~ 31. The test kit of Claim 31 wherein said labeled immunochemically reactive
 2 component is selected from the group consisting of polyclonal antibodies to eEF-2
 3 kinase, monoclonal antibodies to eEF-2 kinase, fragments thereof, and mixtures
 4 thereof.

1 ~~32~~ 32. A method of preventing and/or treating cellular debilitations, derangements
 2 and/or dysfunctions and/or other disease states in mammals, comprising
 3 administering to a mammal a therapeutically effective amount of a material selected
 4 from the following group:

- 5 A. peptides that inhibit eEF-2 kinase;
 6 B. antibodies against eEF-2 kinase; and,
 7 C. other drugs or agents that specifically inhibit eEF-2 kinase.

1 ~~33~~ 33. A pharmaceutical composition for the treatment of cellular debilitation,
 2 derangement and/or dysfunction in mammals, comprising:

- 3 A. a therapeutically effective amount of a material selected from the
 4 group consisting of: peptides that inhibit eEF-2 kinase; antibodies against eEF-2
 5 kinase; and, other drugs or agents that specifically inhibit eEF-2 kinase; and,
 6 B. a pharmaceutically acceptable carrier.

1 ~~33~~³⁴. A recombinant virus transformed with the DNA molecule, or a derivative or
 2 fragment thereof, in accordance with Claim 18.

1 ~~34~~³⁵. A recombinant virus transformed with the DNA molecule, or a derivative or
 2 fragment thereof, in accordance with Claim 19.

1 ~~35~~³⁶. The recombinant DNA molecule of Claim 20 comprising plasmid pGEX-3X,
 2 clone E3 or plasmid pGEX-3X, clone E4.

1 ~~36~~³⁷. An antisense nucleic acid against eEF-2 kinase mRNA comprising a nucleic
 2 acid sequence hybridizing to said mRNA.

1 ~~37~~³⁸. The antisense nucleic acid of Claim 37 which is RNA.

1 ~~38~~³⁹. The antisense nucleic acid of Claim 37 which is DNA.

1 ~~39~~⁴⁰. The antisense nucleic acid of Claim 37 which binds to the initiation codon of
 2 any of said mRNAs.

1 ~~40~~⁴¹. A recombinant DNA molecule having a DNA sequence which, on
 2 transcription, produces an antisense ribonucleic acid against eEF-2 kinase mRNA,
 3 said antisense ribonucleic acid comprising an nucleic acid sequence capable of
 4 hybridizing to said mRNA.

- 1 ~~43~~⁴². A eEF-2 kinase-producing cell line transfected with the recombinant DNA
2 molecule of Claim 41.

- 1 ~~44~~⁴⁴. A method for creating a cell line which exhibits reduced expression of eEF-
2 kinase, comprising transfecting a eEF-2 kinase-producing cell line with a
3 recombinant DNA molecule of claim 41.

- 1 ~~45~~⁴⁵. A ribozyme that cleaves eEF-2 kinase mRNA.

- 1 ~~46~~⁴⁶. The ribozyme of Claim 44 which is a *Tetrahymena*-type ribozyme.

- 1 ~~47~~⁴⁷. The ribozyme of Claim 44 which is a Hammerhead-type ribozyme.

- 1 ~~48~~⁴⁸. A recombinant DNA molecule having a DNA sequence which, upon
2 transcription, produces the ribozyme of claim 44.

- 1 ~~49~~⁴⁹. A eEF-2 kinase-producing cell line transfected with the recombinant DNA
2 molecule of claim 47.

- 1 ~~50~~⁵⁰. A method for creating a cell line which exhibits reduced expression of eEF-2
2 kinase, comprising transfecting a eEF-2 kinase-producing cell line with the
3 recombinant DNA molecule of claim 44.

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